SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT

Draft Socioeconomic Assessment for Proposed Rule 1430 – Control of Emissions from Grinding Operations at Metal Forging Facilities

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EXECUTIVE SUMMARY

A socioeconomic analysis was conducted to assess the impacts of Proposed Rule (PR) 1430—Control of Emissions from Grinding Operations at Metal Forging Facilities. A summary of the analysis and findings are presented below.

Elements of the Proposed Rule	The purpose of PR 1430 is to protect public health by minimizing public exposure to emissions of metal particulate, some of which are toxic air contaminants (TACs) from metal grinding and metal cutting operations at forging facilities. PR 1430 would also help reduce odors. PR 1430 would ensure metal particulate emissions are appropriately vented to pollution control equipment, fugitive emissions are contained within a building enclosure, and housekeeping measures are implemented to further minimize fugitive metal particulate emissions from being re-circulated in the ambient air.
Affected Facilities and Industries	PR 1430 would affect 22 metal forging facilities, which are all classified as being in the fabricated metal manufacturing sector (NAICS 332). Fourteen of the 22 affected facilities are located in Los Angeles County, four in Orange County, and the remaining four in San Bernardino County.
Major Assumptions and Limitation of Analysis	The main requirements of PR 1430 that have major cost impacts would include the installation of baghouses and HEPA filters (point-source controls on existing and new enclosures) and the upgrading of an existing building to a total enclosure or construction of a new total enclosure. Some facilities will be required to add negative air vented to pollution controls to the total enclosure, depending on a facility's proximity to certain sensitive land uses. SCAQMD staff assumed facilities that do not have a modern baghouse would be required to, at a minimum, install a cartridge type baghouse fitted with Polyester (PE) bags. Staff also assumed that facilities that do not meet certain requirements would be required to install HEPA filtration. Further, staff assumed that most facilities would not have adequate ventilation to meet the minimum hood induced capture velocity requirements. Based on these assumptions, SCAQMD staff determined that 17 of the affected facilities subject to the rule would need to install a new baghouse with adequate ventilation to meet the minimum hood induced capture velocity requirements. In addition to a new baghouse, SCAQMD staff assumed that 13 of the 17 facilities that would need to install a new baghouse would also require installation of HEPA filtration. Also, SCAQMD staff assumed that each baghouse required by PR 1430 would need to be properly maintained with replacement PE filter bags biennially and that each HEPA filtration unit would require new filters annually.

	Additionally, staff assumed that each emission collection system would need to conduct periodic smoke tests to ensure adequate capture velocity For the 15 facilities which will need to construct a total enclosure, SCAQMD staff assumes it would cost $118[1] per square foot to construct a total enclosure based on the size of each facility's grinding operation. To further protect nearby sensitive receptors, schools, or preschools, PR 1430 would require 10 facilities to install a total enclosure with negative air. SCAQMD staff assumed that each facility required to install a total enclosure with negative air would need to purchase an anemometer to ensure compliance with the continuous in-draft velocity requirements of the total enclosure at > 200 feet per minute (fpm).
Annualized Compliance Costs	The main requirements of PR 1430 that have cost impacts for affected facilities would include total enclosures, point source emissions controls, source testing, and housekeeping measures. The average annual compliance costs due to PR 1430 is estimated to be $6.0 to $6.2 million depending on the real interest rate assumed (1 to 4 percent). Under the primary scenario, eleven facilities in the non-ferrous forging industry (NAICS 332112), a subset of fabricated metal manufacturing (NAICS 332) would bear the largest share of compliance costs (74% or approximately $4.5 million annually based on a four percent real interest rate in the primary scenario) due to the cost of installing and maintaining baghouses.
Regional Job Impacts	PR 1430 is expected to result in approximately 46 jobs forgone annually between 2017 and 2035 when a 4-percent real interest rate is assumed (approximately 44 jobs with a 1-percent real interest rate). The projected job impacts represent about 0.001 percent of the total employment in the four-county region. The manufacturing sector (NAICS 31-33), which is projected to bear all estimated total compliance costs would have an average of 15 jobs forgone per year. The sector of professional and technical services (NAICS 541) is projected to gain about 8 jobs on an annual average from additional demand for equipment installation and maintenance, expenditures made by the affected facilities to conduct source tests and ambient monitoring analysis as well as filing compliance plans. The remainder of the projected reduction in forecasted jobs would occur across all major sectors of the economy.
Competitiveness	It is projected that the manufacturing sector, where all affected facilities belong, would experience a rise in its relative cost of production by 0.003 percent and a rise in its delivered price by 0.001 percent in 2025 from the implementation of PR 1430.

[1] Based on 2016 Bureau of Labor Statistics Cost for New Industrial Building Construction, https://www.bls.gov/ppi/ppinaics236211.htm

INTRODUCTION

Proposed Rule (PR) 1430 is designed to reduce metal particulate emissions, some of which are toxic air contaminants (TACs) from metal grinding and metal cutting operations at forging facilities. PR 1430 will also help reduce odors from metal grinding and metal cutting operations. Both metal grinding and cutting operations are currently exempt from SCAQMD permits and are currently an unregulated source category. Although some of the metal grinding operations have air pollution controls, most do not. Depending on the metal alloys used in forging operations, some metal particulates can be TACs and pose a potential health risk to the surrounding community if emissions are not controlled.

To minimize the public's exposure to potential TAC emissions from metal grinding and metal cutting operations at metal forging facilities, PR 1430 would require metal particulate emissions to be vented to pollution control equipment, fugitive emissions to be contained within a building enclosure, and housekeeping measures to be implemented.

LEGISLATIVE MANDATES

The socioeconomic assessments at the SCAQMD have evolved over time to reflect the benefits and costs of regulations. The legal mandates directly related to the assessment of the proposed rule include the SCAQMD Governing Board resolutions and sections of the California Health & Safety Code (H&SC).

SCAQMD Governing Board Resolutions

On March 17, 1989 the SCAQMD Governing Board adopted a resolution that calls for an economic analysis of regulatory impacts that includes the following elements:

- Affected industries;
- Range of control costs;
- Cost effectiveness; and
- Public health benefits

On October 14, 1994, the Board passed a resolution directing staff to address the cost effectiveness of rules and amendments and the timing of their proposal. The intent was to bring forth those rules that are cost effective first as defined in the AQMP.

Health & Safety Code Requirements

The state legislature adopted legislation that reinforces and amplifies the Governing Board resolutions for socioeconomic assessments. H&SC Sections 40440.8(a) and (b), which became effective on January 1, 1991, require that a socioeconomic analysis be prepared for any proposed rule or rule amendment that "will significantly affect air quality or emissions limitations."

Specifically, the scope of the analysis should include:

- Type of affected industries;
- Impact on employment and the economy under SCAQMD jurisdiction
- Range of probable costs, including those to industries;
- Emission reduction potential;
- Necessity of adopting, amending or repealing the rule in order to attain state and federal ambient air quality standards; and the
- Availability and cost effectiveness of alternatives to the rule

Additionally, the SCAQMD is required to actively consider the socioeconomic impacts of regulations and make a good faith effort to minimize adverse socioeconomic impacts. H&SC Section 40728.5, which became effective on January 1, 1992, requires the SCAQMD to:

- Examine the type of industries affected, including small businesses; and
- Consider socioeconomic impacts in rule adoption

Finally, H&SC Section 40920.6, which became effective on January 1, 1996, requires that incremental cost effectiveness be assessed for a proposed rule or amendment that imposes Best Available Retrofit Control Technology or "all feasible measures" requirements relating to ozone, carbon monoxide (CO), oxides of sulfur (SOx), oxides of nitrogen (NOx), and their precursors. This statute does not apply to PR 1430; moreover, cost effectiveness in terms of dollars per ton is not meaningful for risk-based regulations, since many other factors besides the amount of pollution affect the risk such as the toxic potency of the contaminant and the location of receptors.

AFFECTED INDUSTRY/FACILITIES

Industry Profile

Metal forging is a manufacturing process where metal is pressed, pounded, or squeezed under great pressure into high strength parts known as forgings. The process is normally performed hot by preheating the metal to a desired temperature before it is worked. While any metal can be forged, some of the most common metals include carbon steel, alloy steel, stainless steel, very hard tool steels, aluminum, titanium, brass, copper, cobalt, nickel, and molybdenum. These metals are found in billets or ingots that are delivered to the respective forging company. The forging industry is composed of plants that: make parts to order for customers (custom forgings), make parts for their own company's internal use (captive forgings), or make standard parts for resale (catalog forgings). Metal forging creates parts that vary in size, shape, and sophistication. Some of the largest customer markets include: aerospace, national defense, automotive, oil industry, agriculture, construction, and general industrial equipment. Employment growth in this sector is driven by the needs of manufacturing facilities, as well as the construction, repair, and maintenance of infrastructure like bridges, buildings, and roadways.

About 3,400 fabricated metal manufacturing[2] establishments (NAICS 332) are located in the four-county region of Los Angeles, Orange, Riverside, and San Bernardino Counties.[3] Currently, the sector supplies about 80,000 jobs to the regional economy which has more over 7 million payroll jobs.[4] Average annual pay in the four-county region for workers in the fabricated metal manufacturing sector is about $54,000, which is four percent below the average pay of about $56,000 in the region.[5]

Affected Facilities

PR 1430 would affect 22 metal forging facilities. Fourteen of the 22 affected facilities are located in Los Angeles County, four in Orange County, and the remaining four in San Bernardino County.

All potentially affected industries are in the fabricated metal manufacturing sector (NAICS 332). Table 2 lists the type of manufacturing at affected facilities, and for each type, the facilities' industry classification, and the number of such facilities. A detailed discussion of the assumptions and basis for the number of facilities that could potentially require additional pollution controls can be found in the Preliminary Draft Staff Report for the proposed rule.[6]

Table 2: Affected Facilities that Potentially Could Need Additional Monitoring and Controls to Comply with PR 1430

Type of Facility	Industry Classification (6-Digit NAICS Code)	Estimated Number of Facilities
Scrap Metal Forgers	Non-Ferrous Forging (332112)	11
Iron and Steel Forgers	Iron and Steel Forging (332111)	8
Heat-Treated Metal Manufacturers	Metal Heat Treating (332811)	1
Steel Mills	Fabricated Structural Metal Manufacturing (332312)	1
Industrial Fasteners Manufacturing	Bolt, Nut, Screw, Rivet, and Washer Manufacturing (332722)	1
Total		**22**

[2] Metal forging facilities are included in the fabricated metal manufacturing sector. The 6-digit NAICS level has limited employment and wage data.
[3] California Employment Development Department (EDD). QCEW Census of Employment and Wages for the 1st Quarter of 2016.
[4] Op cid.
[5] Op cid.
[6] Found at: http://www.aqmd.gov/docs/default-source/rule-book/Proposed-Rules/1430.1/pr1430-pdsr.pdf

Small Businesses

The SCAQMD defines a "small business" in Rule 102 for purposes of fees as one which employs 10 or fewer persons and which earns less than $500,000 in gross annual receipts. The SCAQMD also defines "small business" for the purpose of qualifying for access to services from the SCAQMD's Small Business Assistance Office (SBAO) as a business with an annual receipt of $5 million or less, or with 100 or fewer employees. In addition to the SCAQMD's definition of a small business, the federal Clean Air Act Amendments (CAAA) of 1990 and the federal Small Business Administration (SBA) also provide definitions of a small business.

The CAAA classifies a business as a "small business stationary source" if it: (1) employs 100 or fewer employees, (2) does not emit more than 10 tons per year of either VOC or NOx, and (3) is a small business as defined by SBA. The SBA definitions of small businesses vary by six-digit North American Industrial Classification System (NAICS) codes. In general terms, a small business must have no more than 500 employees for most manufacturing industries, and no more than $7 million in average annual receipts for most nonmanufacturing industries.[7] A business in the industry of fabricated metal manufacturing (NAICS 332) with fewer than 750 to 1,500 employees is considered a small business by SBA.

Information on employees and sales for 19 out of 22 facilities is available, based on 2016 data from Dun and Bradstreet. None of the 19 facilities for which there is sales and employment data were reported as a small business as defined under Rule 102. Under CAAA definition, 13 facilities are considered small businesses and under SBA's definition, all 19 facilities are considered small businesses.

COST ASSUMPTIONS

The main requirements of PR 1430 that have cost impacts for affected facilities would include total enclosures, point source emissions controls, source testing, and housekeeping measures. Probable compliance costs of the proposed rule were developed based on a combination of data supplied by stakeholders from the metal forging industry and included industry representatives, facility operators, equipment manufacturers and vendors. Additionally, SCAQMD staff reviewed each facility's operating permits, performed on-site surveys and conducted phone interviews to determine the type of additional equipment (e.g., high efficiency bags for enhanced emissions control equipment, sweepers for housekeeping, etc.) and services needed to comply with the proposed rule. SCAQMD staff used this permit data and survey information to understand the type and frequency of housekeeping activities currently implemented by each facility subject to the proposed rule and to determine additional housekeeping activities to be implemented by each to comply with the requirements of PR 1430.

[7] See the SBA website (http://www.sba.gov/community/blogs/community-blogs/small-business-matters/what-small-business-what-you-need-know-and-wh).The latest SBA definition of small businesses by industry can be found at http://www.sba.gov/content/table-small-business-size-standards.

The costs presented in this assessment primarily cover both the capital cost and maintenance cost of emissions control equipment, for example, the use of polytetrafluoroethylene (PTFE) baghouse bags and sweepers for housekeeping. However, the costs do not include uncertainties or unexpected construction costs (e.g., variations in final quantities of PTFE bags needed, additional engineering cost, and/or contract administration). The costs presented in this assessment are intended to represent typical to high costs for equipment, maintenance activities and administrative review. All estimated costs have been adjusted to reflect 2015 dollar values.

COMPLIANCE COSTS

The main requirements of PR 1430 that have cost impacts for affected facilities would include total enclosures, point source emissions controls, housekeeping, and source tests. The annual compliance costs due to PR 1430 are estimated to range from $6.0 million to $6.2 million, depending on the real interest rate assumed (1%-4%).[8] Table 3 presents average annual compliance cost of PR 1430 by requirement categories.

[8] In 1987, SCAQMD staff began to calculate cost-effectiveness of control measures and rules using the Discounted Cash Flow method with a discount rate of 4 percent. Although not formally documented, the discount rate is based on the 1987 real interest rate on 10-year Treasury Notes and Bonds, which was 3.8 percent. The maturity of 10 years was chosen because a typical control equipment life is 10 years; however, a longer equipment life would not have corresponded to a much higher rate-- the 1987 real interest rate on 30-year Treasury Notes and Bonds was 4.4 percent. Since 1987, the 4 percent discount rate has been used by SCAQMD staff for all cost-effectiveness calculations, including BACT analysis, for the purpose of consistency. The incremental cost reported in this assessment was thus annualized using a real interest rate of four percent as the discount rate. As a sensitivity test, a real interest rate of one percent will also be used, which is closer to the prevailing real interest rate.

Table 3: Annual Compliance Costs of PAR 1430 by Category (2015 Dollars)

Category	Total Cost	Annualized Cost at 4% Real Interest Rate	Annualized Cost at 1% Real Interest Rate
Point Source Control-Baghouse*	$7,872,558	$970,615	$831,200
Point Source Control-HEPA*	$715,593	$88,226	$75,553
Total Enclosure**	$1,390,187	$102,292	$77,037
Cost of Total Enclosure with Negative Air*	$627,034	$104,917	$89,847
Total Enclosure with Negative Air Anemometer*	$8,985	$1,107	$948
Housekeeping Equipment – Vacuum***	$62,244	$11,873	$10,740
PM Emissions Source Test (Every Year)	$165,000	$165,000	$165,000
Hexavalent Chromium (CrVI) and Multi-Metals Emissions Source Test (Every 4 Years)	$495,000	$123,750	$123,750
Smoke Test (4 Times a Year)	$2,096	$8,383	$8,383
Baghouse Maintenance (Every 2 Years)	$1,567,410	$783,705	$783,705
HEPA Maintenance (Every Year)	$840,910	$840,910	$840.910
Housekeeping Roof Cleaning (Twice a Year)	$31,250	$68,345	$68,345
Annual Electricity	$2,902,854	$2,902,854	$2,902,854
Total		**$6,171,980**	**$5,978,276**

*Cost is annualized over 10 years of expected equipment life
**Cost is annualized over 20 years of expected equipment life
***Cost is annualized over 6 years of expected equipment life
Note: Cost estimates based staff conversations with vendors

Total Enclosures

A total enclosure is defined in PR 1430 as a permanent containment structure, completely enclosed with a floor, walls, and a roof to prevent exposure to the elements, (e.g., precipitation, wind, run-off), with limited openings to allow access and egress for people and vehicles, that is free of breaks, cracks, gaps, or deterioration that could cause or result in fugitive metal dust. PR 1430 requires that within six months of rule adoption, facilities that are conducting metal grinding or metal cutting within a building, must conduct all metal grinding and metal cutting operations inside a total enclosure and minimize the release of fugitive metal dust emissions from passages, doorways, and bay doors. For facilities not conducting metal grinding or metal cutting in a building prior to date of rule adoption, metal grinding and metal cutting operations are to be conducted within a total enclosure and minimize the release of fugitive metal dust emissions within 12 months of rule adoption. The primary intent of this requirement is to provide maximum containment and minimize fugitive metal dust emissions and odors generated from areas where metal grinding occurs. SCAQMD staff assumed that it would cost approximately $10 per square foot of wall area to convert an existing building to a total enclosure and that it would cost $118[9] per square foot of building space to construct a new total enclosure (i.e., construction of total enclosure without an existing building). Based on the proposed requirements of

[9] Based on 2016 Bureau of Labor Statistics Cost for New Industrial Building Construction, https://www.bls.gov/ppi/ppinaics236211.htm

PR 1430 four (4) facilities would be required to build a new total enclosure and three (3) facilities would be required to convert an existing building to a total enclosure. Based on the size of each facility's grinding operation, SCAQMD staff determined that this requirement would result in a capital cost of $1.4 million.

To further protect nearby sensitive receptors[10], PR 1430 would require some facilities to install negative air vented to pollution controls for the total enclosure. Specifically, an owner or operator that conducts metal grinding or metal cutting operations within 500 feet of a sensitive receptor that is not a school[11], or within 1,000 feet of a school, pre-school, early headstart or headstart, measured from the edge of the total enclosure to the property line of the nearest sensitive land use would be required to vent the total enclosure to an emission control device no later than 6 months after a Permit to Construct for the emission control device is issued by the Executive Officer. The in-draft velocity of the total enclosure with negative air shall be continuously maintained at a minimum of 200 feet per minute at any opening including, but not limited to, vents, windows, passages, doorways, bay doors, and roll-up doors. The in-draft velocity of 200 fpm was selected based on U.S. EPA Method 204 – Criteria for and Verification of a Permanent or Temporary Enclosure. SCAQMD staff based the install negative air on an established cost formula from the sixth edition of the U.S. EPA's Air Pollution Control Cost Manual[12] that accounts for additional capital costs incurred for the purchase of equipment such as fans, motors, vents, ductwork, and doors and the installation cost for this equipment. Additionally, SCAQMD staff assumed that each of the 10 facilities required to install negative air for the total enclosure would need to purchase an anemometer[13] to ensure compliance with the continuous in-draft velocity requirements of the total enclosure at > 200 fpm. SCAQMD staff determined that the installation of negative air for ten (10) facilities would result in a capital cost of $850,975 and an additional $8,985 for the capital cost of anemometers.

Point Source Emissions Controls

Subdivision (e) – Metal Grinding and Cutting Emissions Requirements of PR 1430 requires emissions from metal grinding and metal cutting operations to be vented to an emission control device no later than 6 months after a Permit to Construct for the emission control device is issued by the Executive Officer. The emission control device shall not exceed a PM outlet concentration of 0.002 grains of particulate matter per dry standard cubic foot (gr/dscf). Also, PR 1430 requires that the final stage of any emission control device be fitted with HEPA filters or filter media rated by the manufacturer to achieve a minimum of

[10] Any residence including private homes, condominiums, apartments, and living quarters; daycare centers; health care facilities such as hospitals or retirement and nursing homes; long-term care hospitals, hospices, prisons, and dormitories or similar live-in housing.

[11] Any public or private school, including early headstart education (birth to 3 years old), headstart education (3 to 5 years old), preschools (3-4 years old), and juvenile detention facilities with classrooms, used for purposes of the education of more than 12 children at the school, including kindergarten and grades 1 through 12, inclusive, but does not include any private school in which education is primarily conducted in private homes. The term includes any building or structure, playground, athletic field, or other area of school property, but does not include unimproved school property.

[12] Based on EPA Air Pollution Control Cost Manual, Sixth Edition, January 2002, https://www3.epa.gov/ttncatc1/dir1/c_allchs.pdf

[13] Based on vane anemometer by Omega, http://www.omega.com/pptst/HHF-SD2.html

99.97% control efficiency for 0.3 micron particles, and designed in a manner that does not conflict with requirements or guidelines set forth by the OSHA or CAL-OSHA regarding worker safety, and the National Fire Protection Association (NFPA) regarding safety. Further, all emission control devices are required to be operated at the minimum hood induced capture velocity specified in the most current edition of the *Industrial Ventilation, A Manual of Recommended Practice for Design*, published by the American Conference of Governmental Industrial Hygienists, at the time a permit application is deemed complete with the SCAQMD.

To assess the socioeconomic impacts of metal grinding and metal cutting point source emissions controls required by PR 1430, SCAQMD staff assumed facilities subject to the point source emissions control requirements of subdivision (e) that do not have a modern baghouse would be required to, at a minimum, install a cartridge type baghouse fitted with Polyester (PE) bags. Staff also assumed that facilities that do not meet the criteria specified in paragraph (e)(3) would be required to install HEPA filtration. Further, staff assumed that most facilities would not have adequate ventilation to meet the minimum hood induced capture velocity requirements.

Based on these assumptions SCAQMD staff determined that 18 of the affected facilities subject to the rule would need to install a new baghouse with adequate ventilation to meet the minimum hood induced capture velocity requirements. In addition to a new baghouse SCAQMD staff assumed that 13 of the affected facilities would require installation of HEPA filtration. Also, SCAQMD staff assumed that each baghouse required by PR 1430 would need to be properly maintained with replacement PE filter bags biennially and that each HEPA filtration unit would require new filters annually. Additionally, staff assumed that each emission collection system would need to conduct periodic smoke tests per paragraph (i)(4) to ensure adequate capture velocity consistent with paragraph (e)(4). Thus, SCAQMD staff estimated that the capital cost for metal grinding and metal cutting point source controls[14] would be approximately $7.8 million including an annual maintenance cost of approximately $4.45 million for biennial PE filter bag replacement[15] and annual HEPA filter replacement.[16] It should be noted that the annual maintenance cost for the baghouse and HEPA filtration includes an annual energy cost (i.e., $2.9 million annually for electricity use alone) for operation of the point source control devices.

Housekeeping

PR 1430 includes housekeeping requirements that are proposed to minimize fugitive metal emissions. All requirements would be effective within 30 days of rule adoption except for the requirements to conduct semi-annual roof top wet cleanings or vacuuming with a HEPA

[14] Based on U.S. EPA Air Pollution Control Cost Manual, Sixth Edition, January 2002, https://www3.epa.gov/ttncatc1/dir1/c_allchs.pdf

[15] Assumes change out of polyester cartridge bags biennially, estimated cost from Section 6 of EPA Air Pollution Control Cost Manual, Sixth Edition, January 2002 , Table 1.8: Bag Prices, average of polyester pulse jet, cartridge filter bags, (i.e. bag diameter 4-7/8 and 6-1/8 inches)

[16] Based on 2010 SCAQMD Rule 1420.1 Socioeconomic Analysis, estimated HEPA costs are: $2/ cubic feet per minute (cfm) for 1 - 10,000 cubic feet per minute(cfm); $1.75/cfm for 10,001 cfm - 80,000 cfm; $0.75/cfm for 80,001 cfm - 125,00 cfm.

vacuum. Upon surveying each facility subject to PR1430, SCAQMD staff concluded that most facilities currently conduct housekeeping measures much like the proposed requirements using mobile wet sweepers, however, some facilities do not possess the proper equipment to maneuver in confined areas near grinding and cutting equipment. Therefore, SCAQMD staff assessed an additional cost impact ranging of approximately $2,400 per additional HEPA vacuum[17]needed at each facility. As a result, SCAQMD staff determined that the additional housekeeping measures required by PR 1430 would result in a capital cost of approximately $62,000. Further, SCAQMD staff assumed that it would cost $68,000[18] annually to conduct roof washings required by the housekeeping requirements of the rule.

Source Tests

The proposed rule would require annual source tests for PM emissions once every 12 months to demonstrate compliance with the particulate emission standard of 0.002 grains per dry cubic foot. If an annual source test demonstrates that PM emissions were no more than 50% of the PM emission standard of 0.002 grains of particulate matter per dry standard cubic foot the next test for PM emissions from that emission control device may be performed no later than 24 months after the date of the most recent test.

Additionally, initial source tests for hexavalent chromium and multiple metal emissions would be required. Subsequent source tests for hexavalent chromium and multiple metal emissions are required once every 48 months to be harmonious with the AB2588 quadrennial cycle for evaluating risk. However, if a facility demonstrates metal grinding or metal cutting operations contain total chromium concentrations of 1% or less during the removal or disposal of any baghouse catch as determined by a metals analysis by X-ray fluorescence, the owner or operator is not required to source test once every 48 months. If an analysis by X-ray fluorescence demonstrates that a metal grinding or metal cutting operation contain greater than 1% of total chromium the owner or operator must resume the quadrennial schedule.

SCAQMD staff estimates that the cost per stack for an outlet emissions source test[19] are as follows: $5,000 for a PM outlet emissions source test, $7,500 for a hexavalent chromium emissions outlet source test, and $7,500 for a multiple metals emissions outlet source test. SCAQMD staff assumed that the cost to conduct a hexavalent chromium source test would exceed the cost of a metals analysis by X-ray fluorescence, therefore, the cost to comply with the source test requirements for the proposed rule is limited to source testing for outlet emissions of the following: PM, hexavalent chromium, and multiple metals. Based on these estimated costs SCAQMD staff assumed it would cost approximately $288,000 annually.

[17] Based on cost of a single 15 gallon HEPA Vacuum, http://www.minutemanvac.com/minuteman-vac-x839-dry-vacuum.html

[18] Assumes a cost of $1,000 per washing and $250 of water use based on 2010 version of Rule 1420.1.

[19] Based on multi-metals source test costs for SCAQMD Rule 1420.2 Socioeconomic Analysis and communication with SCAQMD Source Testing staff on 1/3/2017.

Table 4 summarizes the projected compliance costs by industry. The non-ferrous forging industry (NAICS 332112) would bear the largest share of compliance costs (74% or an annual average of $4.5 million) primarily due to the construction and maintenance of baghouses.

Table 4: Projected Compliance Costs by Industry for Affected Facilities that Potentially Could Need Additional Pollution Controls (2015 Dollars)

Industry that Typically Uses the Equipment (6-Digit NAICS Code)	Number of Facilities	Projected Annual Compliance Costs	
		4% Real Interest Rate	1% Real Interest Rate
Non-Ferrous Forging (332112)	11	$4,536,565	$ 4,395,555
Iron and Steel Forging (332111)	8	$ 1,351,856	$ 1,305,802
Metal Heat Treating (332811)	1	$ 55,425	$ 54,576
Fabricated Structural Metal Manufacturing (332312)	1	$ 224,945	$ 219,197
Bolt, Nut, Screw, Rivet, and Washer Manufacturing (332722)	1	$ 3,190	$ 3,147
All Industries		**$ 6,171,980**	**$ 5,978,277**

Table 5 shows the range of projected compliance costs by facility. It is important to note that some facilities appear to be disproportionately affected by the rule, however, these facilities have no existing air pollution controls for their metal grinding or metal cutting operation. As a result, the facilities will be required to install sufficient air pollution controls to comply with PR 1430. By comparison, some other facilities that have significantly lower compliance costs have existing controls that require minimal upgrades to comply with PR 1430.

Table 5: Projected Compliance Costs by Facility that Potentially Could Need Additional Pollution Controls (2015 Dollars)

Facility	Projected Annual Compliance Costs	
	4% Real Interest Rate	1% Real Interest Rate
Facility A	$3,190	$3,147
Facility B	$3,190	$3,147
Facility C	$23,549	$22,937
Facility D	$50,020	$47,558
Facility E	$55,425	$54,576
Facility F	$65,996	$63,776
Facility G	$72,447	$72,259
Facility H	$114,591	$108,447
Facility I	$174,793	$169,370
Facility J	$198,308	$198,210
Facility K	$216,891	$210,743
Facility L	$218,779	$208,450
Facility M	$224,945	$219,197
Facility N	$233,585	$228,388
Facility O	$253,118	$242,645
Facility P	$281,085	$272,797
Facility Q	$284,639	$275,715
Facility R	$583,629	$570,517
Facility S	$660,334	$645,400
Facility T	$752,993	$735,241
Facility U	$826,235	$798,063
Facility V	$874,238	$827,693
Total 22 Facilities	**$6,171,980**	**$5,978,277**

MACROECONOMIC IMPACTS ON THE REGIONAL ECONOMY

The REMI model (PI+ v2.0.3) was used to assess the total socioeconomic impacts of PR 1430. The model is appropriate to be used for evaluating the impacts from a policy change and links the economic activities in the counties of Los Angeles, Orange, Riverside, and San Bernardino, and for each county, it is comprised of five interrelated blocks: (1) output and demand, (2) labor and capital, (3) population and labor force, (4) wages, prices and costs, and (5) market shares.[20]

The assessment herein is performed relative to a baseline where PR 1430 would not be implemented. The proposed rule would create a policy scenario under which the affected

[20] Within each county, producers are made up of 66 private non-farm industries, three government sectors, and a farm sector. Trade flows are captured between sectors as well as across the four counties and the rest of U.S. Market shares of industries are dependent upon their product prices, access to production inputs, and local infrastructure. The demographic/migration component has 160 age/gender/race/ethnicity cohorts and captures population changes in births, deaths, and migration. (For details, please refer to REMI online documentation at http://www.remi.com/products/pi.)

facilities would incur annual compliance costs totaling $5.9 million to $6.1 million to install additional control equipment and comply with other requirements of PR 1430. The annualized compliance costs are assumed to start in 2017 and would remain the same until 2035, the last year of the analysis time frame.

Direct effects of PR 1430 have to be estimated and used as inputs to the REMI model in order for the model to assess secondary and induced impacts for all the actors in the four-county economy on an annual basis and across a user-defined horizon (2017 to 2035). Direct effects of the proposed rule include additional costs to the affected entities and additional sales, by local vendors, of equipment, devices, or services that would meet the proposed requirements. While compliance expenditures may increase the cost of doing business for affected facilities, the purchase of additional baghouses and HEPA filters combined with spending on total enclosures, source tests, and housekeeping measures, may increase sales in other sectors. Table 6 lists the industry sectors modeled in REMI that would either incur cost or benefit from the compliance expenditures.[21]

[21] It is worth mentioning that improved public health due to reduced air pollution emissions may also result in a positive effect on worker productivity and other economic factors; however, public health benefit assessment requires the modeling of air quality improvements. Therefore, it is conducted for Air Quality Management Plans and not for individual rules or rule amendments.

Table 6: Industries Incurring *vs.* Benefitting from Compliance Costs/Spending

Source of Compliance Costs	REMI Industries Incurring Compliance Costs (3-digit NAICS)	REMI Industries Benefitting from Compliance Spending (NAICS)
Baghouse	Fabricated Metal Manufacturing (332)[22]	*One-time-Capital:* Machinery Manufacturing (333)
HEPA Filters		*One-time-Capital:* Machinery Manufacturing (333)
Building Enclosure		*One-time-Capital:* Construction (236)
Housekeeping Vacuum		*One-time-Capital:* Electric Equipment and Appliances (335)
Building Enclosure Negative Air & Anemometer		*One-time-Capital:* Computer and Electronics (334)
Smoke and Source Tests		*Recurring Cost:* Professional, Scientific, and Technical Services (541)
Roof Washing		*Recurring Cost:* Construction/Contractors (238)
Energy\Utilities		*Recurring Cost:* Utilities (221)
Baghouse Maintenance		*Recurring Cost:* Professional, Scientific, and Technical Services (541)

PR 1430 is expected to result in approximately 46 jobs forgone between 2017 and 2035 when a 4-percent real interest rate is assumed (approximately 44 jobs with a 1-percent real interest rate). The projected job impacts represent about 0.001 percent of the total employment in the four-county region. As presented in Table 7, almost all major sectors of the regional economy would incur minor jobs forgone from induced and secondary impacts of PR 1430.

[22] See Table 5 for the 6-digit breakdown of affected facilities in the fabricated metal manufacturing sector.

It is estimated that in 2017, 32 additional jobs would be created in the overall economy. Positive job impacts in the sector of manufacturing (NAICS 31-33) are due to purchase of various types of control equipment by the affected facilities (as presented in Table 6). The sector of professional and technical services (NAICS 541) are projected to gain 8 jobs annually from additional demand for equipment installation and maintenance as well as expenditures made by the affected facilities to conduct source tests and ambient monitoring analysis as well as filing compliance plans.

Although the manufacturing sector would bear the majority of estimated total compliance costs of the PR 1430, the regional industry job impact is projected to be relatively small (annual average of 15 jobs foregone between 2017 and 2035). This is because other businesses in the manufacturing sector, specifically in the machinery manufacturing industry, are expected to benefit from the increased sale of various types of control equipment, thus offsetting the direct effect of compliance costs incurred by other manufacturing facilities. In earlier years, positive job impacts from the expenditures made by the affected facilities would more than offset the jobs forgone from the additional cost of doing business.

Table 7: Job Impacts of Proposed Rule

Industries (NAICS)	2017	2025	2035	Average Annual Jobs (2017-2035)	Average Annual Baseline Jobs without Rule (2017-2035)	% Change from Baseline Jobs
Construction (23)	9	-5	-3	-3	503,355	-0.0007
Utilities (22)	3	2	2	2	18,671	0.0122
Machinery (333)	8	2	1	2	27,645	0.0088
Fabricated Metal (332)	-3	-13	-13	-12	92,645	-0.0126
Rest of Manufacturing (31-33)	0	-7	-6	-6	526,180	-0.0011
Total Manufacturing (31-33)	5	-18	-18	-15	646,469	-0.0023
Wholesale trade (42)	1	-3	-2	-2	491,455	-0.0004
Retail trade (44-45)	-3	-8	-7	-7	1,010,271	-0.0007
Professional and technical services (54)	13	7	6	8	947,238	0.0008
Food services and drinking places (722)	0	-4	-4	-4	737,569	-0.0005
Government (92)	1	-4	-5	-3	912,517	-0.0004
Other Industries	2	-23	-22	-20	6,858,324	-0.0001
Total	**32**	**-57**	**-53**	**-46**	**12,125,869**	**-0.0004**

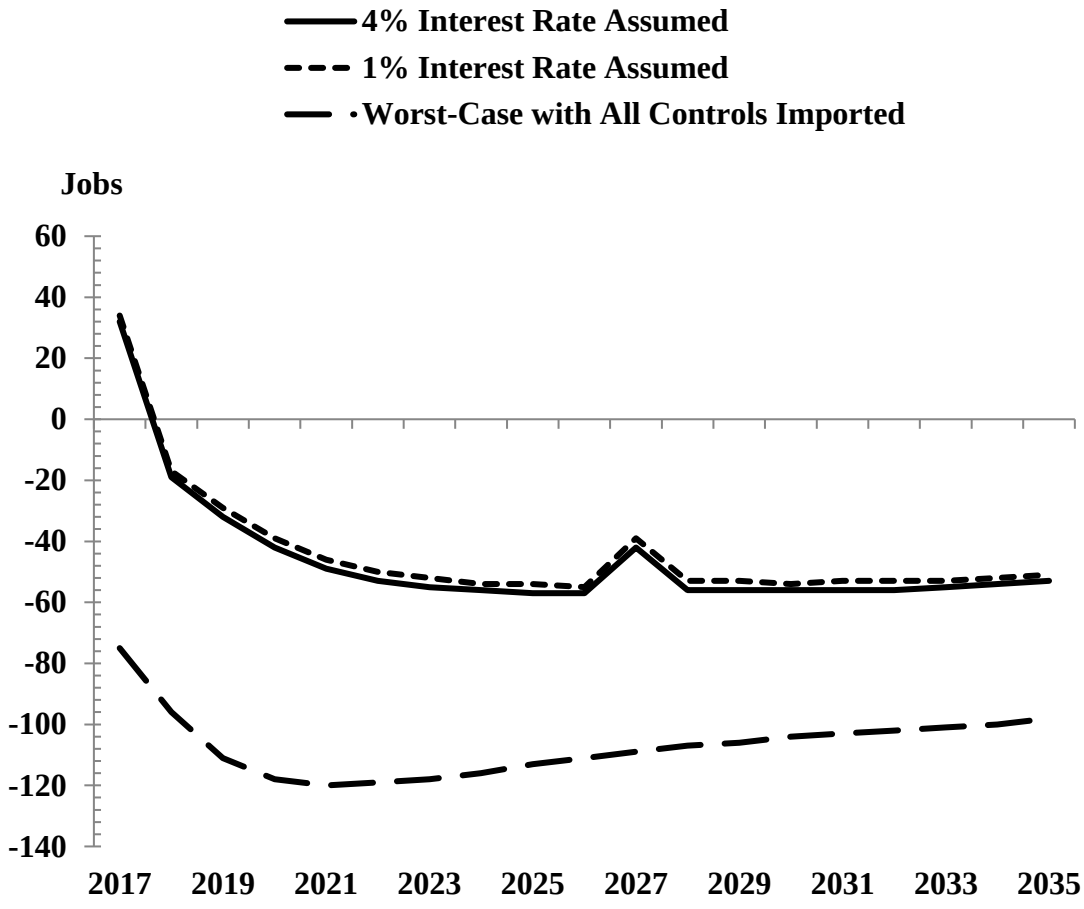
*Note: Jobs includes self-employment.

Figure 1 presents a trend of job gains and losses from 2017 to 2035. During the first few years of implementation, small positive job impacts would be expected in sectors associated with the installation of controls and the construction of enclosures. Negative

job impact would lessen slightly in year 2027 when the affected facilities would need to replace point-source controls at the end of their equipment life. The replacement purchase in itself would act as a temporary stimulus to the regional economy if, as assumed under the primary scenario, part of this spending would benefit local vendors of pollution controls and installation services by increasing their sales volume.

In addition, staff has analyzed an alternative scenario (worst-case) where the affected facilities would not purchase any controls or services from providers within the Basin, which would result in an average of 107 jobs forgone annually.

Figure 1: Projected Regional Job Impact, 2017-2035



Competitiveness

The additional cost brought on by PR 1430 would increase the cost of services rendered by the affected industries in the region. The magnitude of the impact depends on the size and diversification of, and infrastructure in a local economy as well as interactions among industries. A large, diversified, and resourceful economy would absorb the impact described above with relative ease.

Changes in production and service costs would affect prices of goods produced locally. The relative delivered price of a good is based on its production cost and the transportation cost of delivering the good to where it is consumed or used. The average price of a good at the place of use reflects prices of the good produced locally and imported elsewhere.

It is projected that the manufacturing sector, where most of the affected facilities belong, would experience a rise in its relative cost of production by 0.003 percent and a rise in its delivered price by 0.001 percent in 2025 from the implementation of PR 1430.

RULE ADOPTION RELATIVE TO THE COST EFFECTIVENESS SCHEDULE

On October 14, 1994, the Governing Board adopted a resolution that requires staff to address whether the rules being proposed for adoption are considered in the order of their cost-effectiveness. The 2012 Air Quality Management Plan (AQMP) ranked, in the order of cost-effectiveness, all of the control measures for which costs were quantified. It is generally recommended that the most cost-effective actions be taken first. PR 1430 would reduce metal particulate, some of which are toxic air contaminants, and thus was not ranked by cost-effectiveness relative to other AQMP control measures in the 2012 AQMP.

INCREMENTAL COST-EFFECTIVENESS

Please refer to the Staff Report.

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